



Overview of Grain handling Standards 1910.272

James Maness
SEGF/GGFA/NGFA Safety Seminar
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OSHA Citations and Emphasis

Local Emphasis Programs

- **1910.272 – Grain handling facilities**
- **1910.219 – Mechanical power-transmission apparatus**
- **1910.023 – Guarding floor and wall openings and holes**
- **1910.146 – Permit-required confined spaces**
- **1910.305 – Electrical Wiring methods and components**
- **1910.1200 – Hazard Communication**
- **1910.134 – Respiratory Protection**
- **1910.147 – Lockout/Tagout of equipment**
- **1910.027 – Fixed Ladders**
- **1910.303 – Electrical, General Requirements**

OSHA Most Frequent Citations of 1910.272 Grain Handling Standards

- **Jo1 – No written housekeeping program for dust.**
- **Go1 I – Did not issue a permit prior to entering the bin.**
- **Go1 II – Failure to lockout equipment in a bin prior to entry.**
- **Go4 – Did not have rescue equipment suitable for the bin.**
- **Eo2 – Did not train workers for special tasks, (bin entry).**
- **Go2 – No lifelines and harnesses for employees entering the bin.**
- **Jo2 II – Did not immediately remove dust accumulations**
- **D – failure to implement an emergency action plan.**
- **Go1 III – Failure to test the atmosphere within a bin before entry.**
- **Mo3 – Failure to maintain certification record of PM/inspections.**

Fires & Dust Explosion Hazards



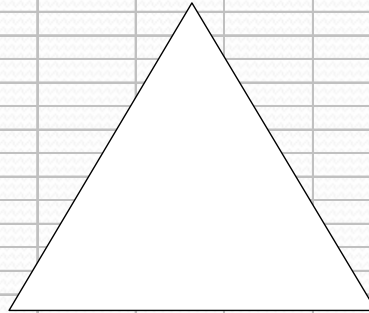


Dust Explosions

- We have had great success to eliminate or control fires and dust explosions in our industry since 1977-78.
- However, we cannot relax our guard as the threat of explosions will always be with us.
- Recent Sugar dust Explosions in Port Wentworth, GA and in other industries have brought more government action to try to remedy explosion causes.

Dust Explosion Elements

- FUEL**
- Grain dust
 - Powdered food product
 - Explosive dust clouds resemble a very dense fog
 - Dust layers can be thrown in suspension causing more intense secondary explosions



IGNITION SOURCE

- Must exceed minimum ignition energy and temperature [over 400°F (204 °C)]

- Typical Sources

- open flames (lighters, matches, fires, burning cigarettes)
- electrical sparks and failures
- hot surfaces
- overheated bearings
- slipping bucket elevator belts or v-belts
- improper welding and cutting
- grinding or equipment sparks
- foreign objects

OXYGEN

- Air is everywhere
- Suppression can interfere with the explosion reaction (Halon, CO² chemical powder, H²O)
- Normally not practical

CONTAINMENT/ENCLOSURES

- Eliminate containment
- open structures
- explosion venting
- outside location of critical equipment (legs, filter, etc.)
- separation of buildings
- Build to withstand explosion

Houston Before



Houston After



Westwego

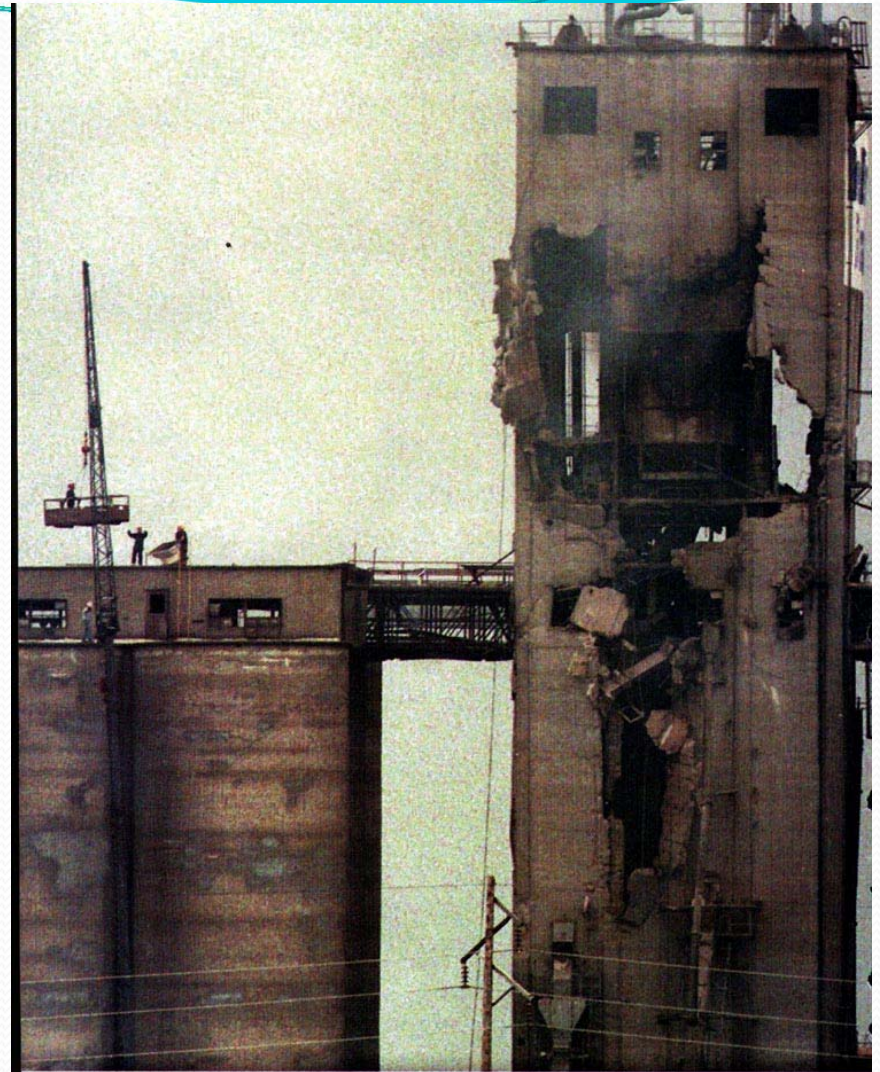


Galveston



Kansas Dust Explosion

SEVEN DEAD IN DEBRUCE GRAIN ELEVATOR BLAST

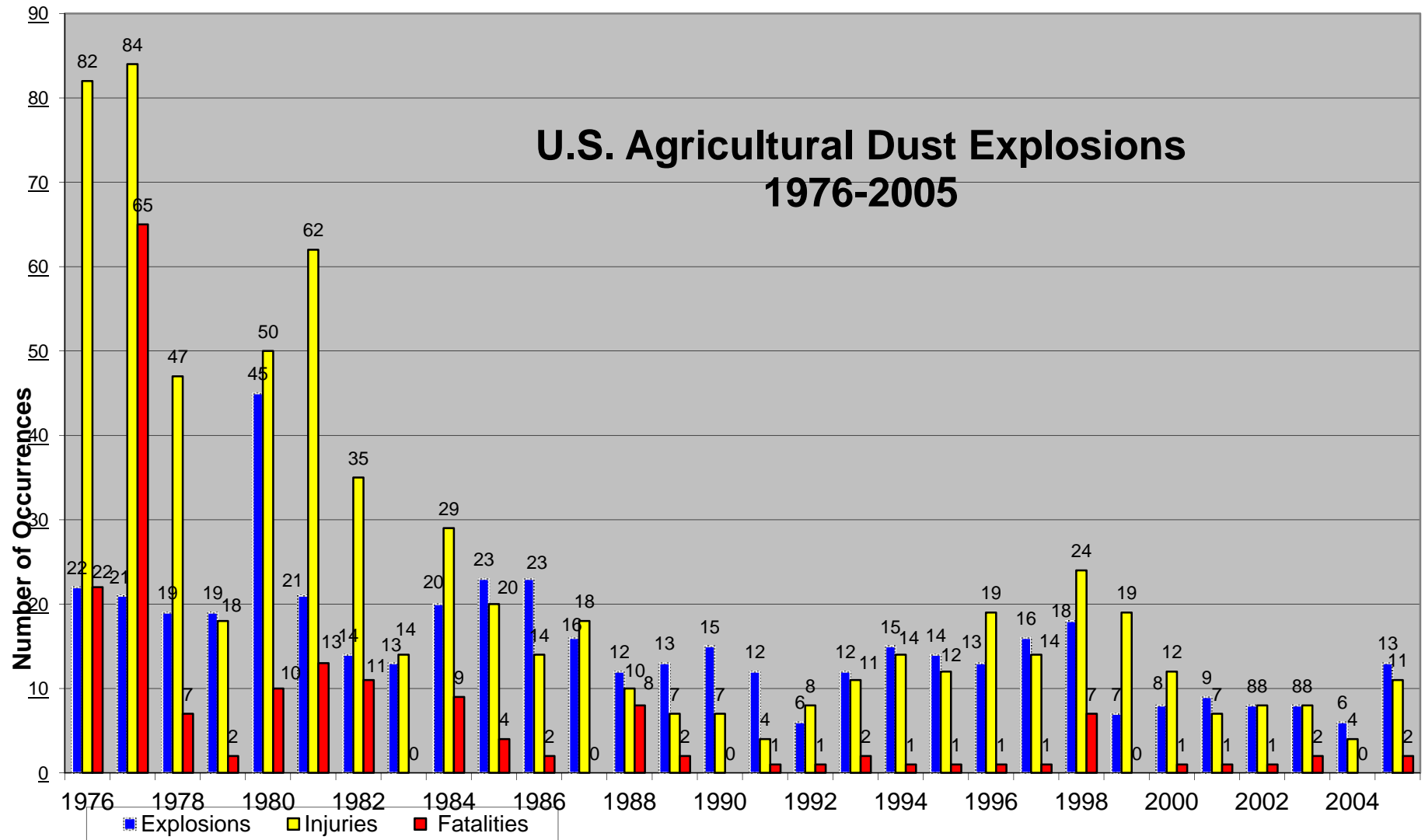


Georgia Sugar explosion 2008

February 7, 2008, Sugar Dust Involved
14 Killed, Over 40 Injured



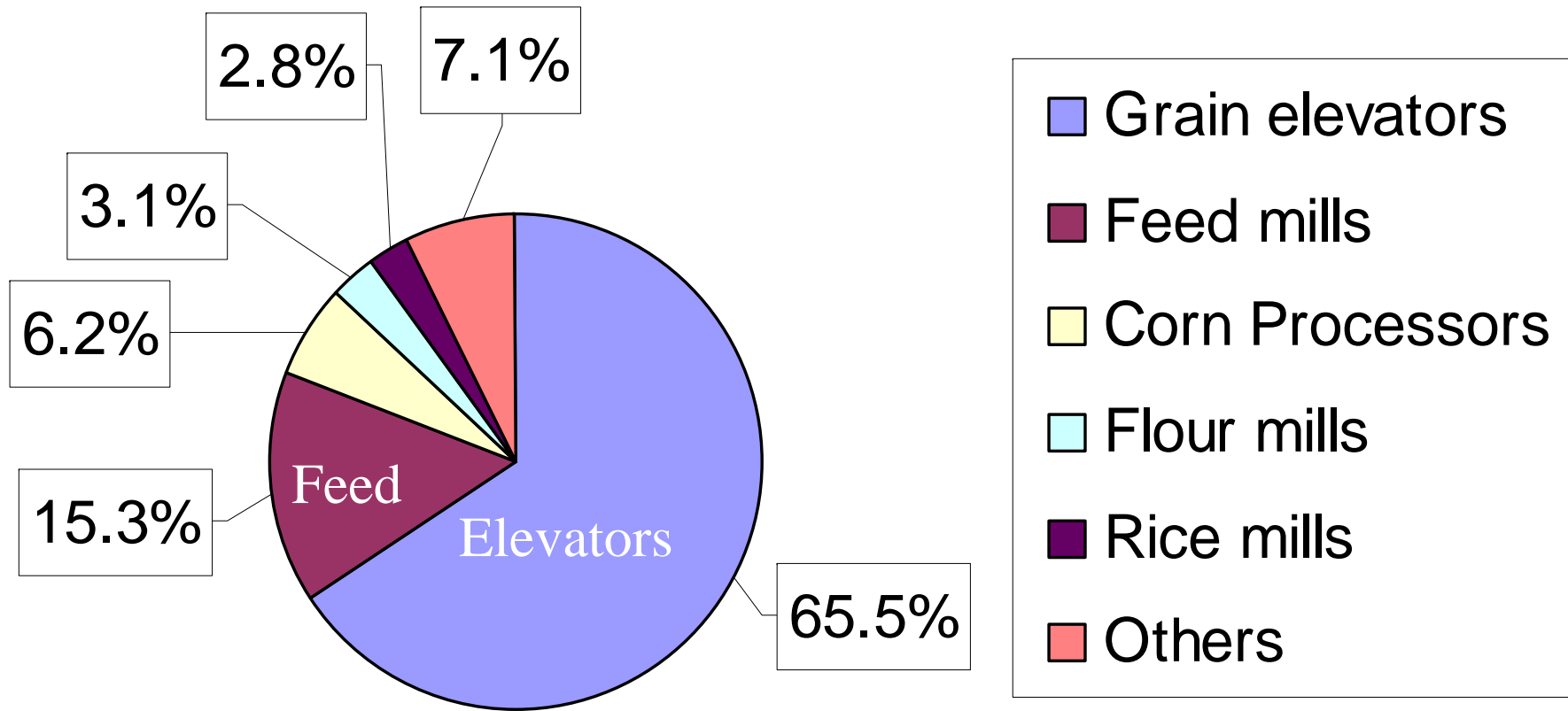
U.S. Agricultural Dust Explosions 1976-2005



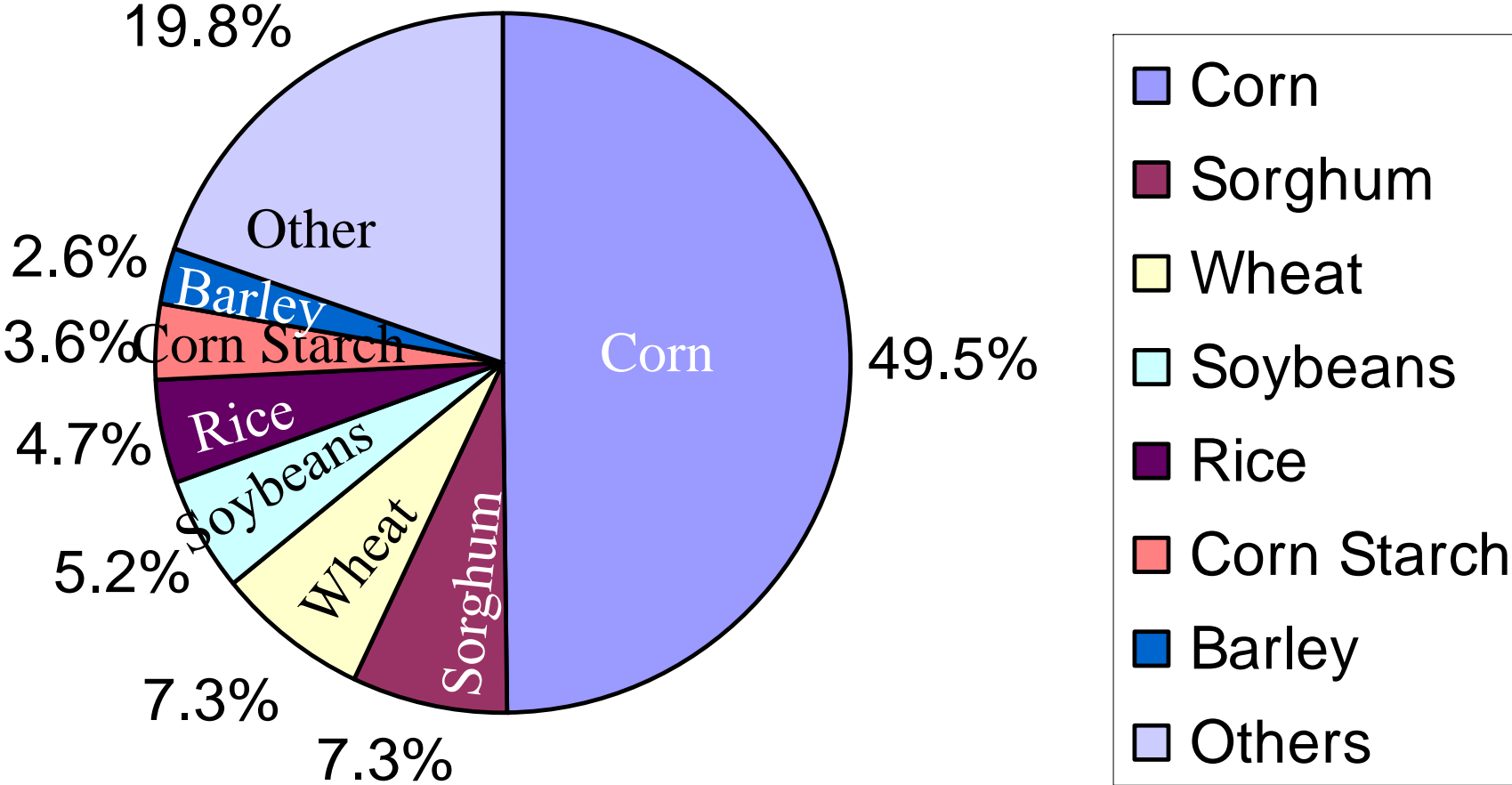
Secondary
Explosions cause
the most damage.



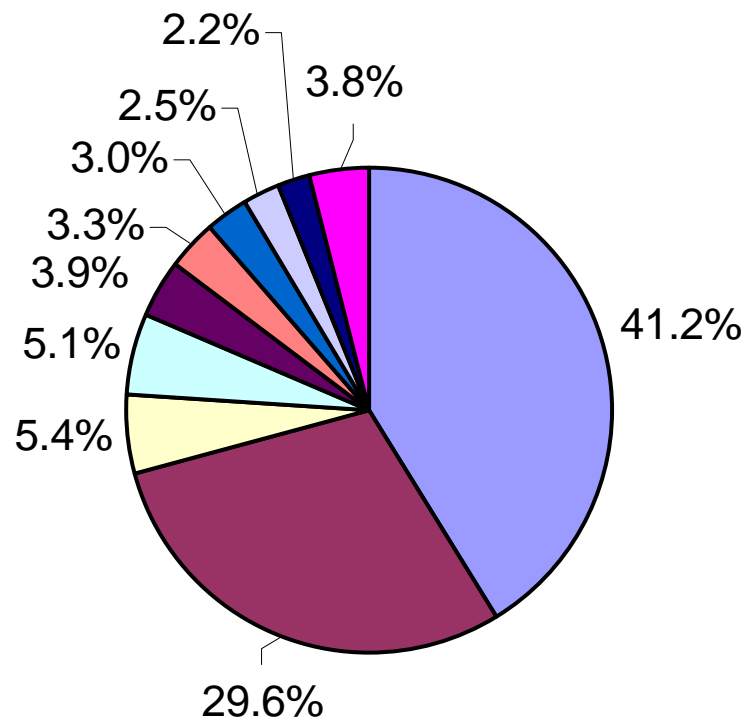
Grain Dust Explosion Factors



Grains Involved in Explosions



Probable Location of Primary Explosions for a 27 Year Period



- Unknown
- Bucket Elevator
- Bins and Tanks
- Grinding Equipment
- Dust Collector
- Other areas inside elev.
- inside other equipment
- Headhouse
- Adjacent or attached Feed Mill
- Other

Management Practices

- **Emphasize good housekeeping (Written plan with daily inspections)**
- **Have a comprehensive Maintenance Program**
- **Utilize safe hotwork procedures**
- **Establish an emergency procedure plan**
- **Review Company Training program**
- **Ensure good safety communication**
- **Enforce Safety Rules**
- **Install safety devices slow-down devices or plug switches where needed.**
- **Have a program to deal with outside contractors**



Emergency Action Plan

- See the suggested model plan in the emergency action tab.
- If you have less than 10 employees you do not have to have a written EAP but must cover all the elements outlined in 1910.38a orally with employees.

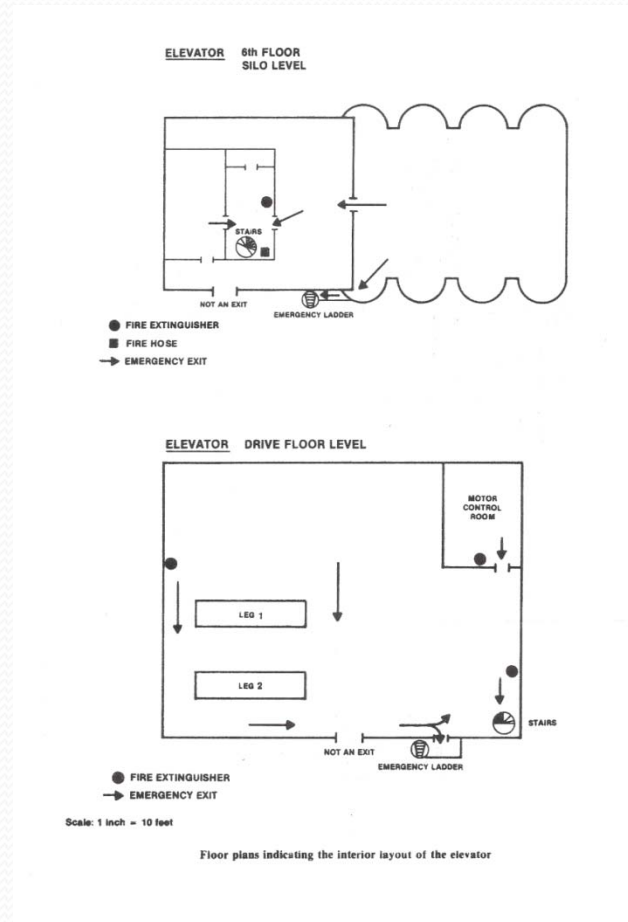


Emergency Action Plan

- Establish an evacuation alarm and methods to contact fire department
- Designate escape routes, responsibilities and procedures
- Have an assembly area and account for personnel.
- Train workers and others as needed in the plan.
- Meet with and include the fire Department and emergency responders in the plan.

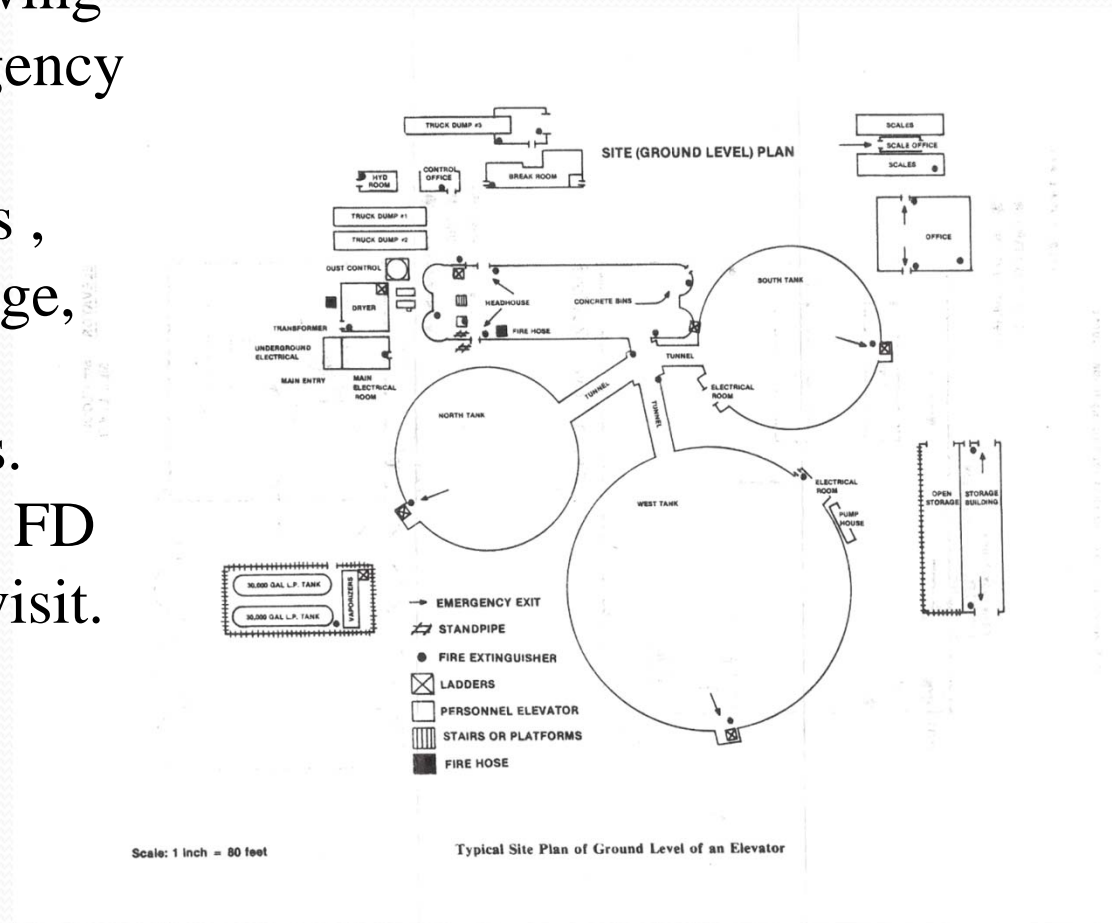
Emergency Action Plan

Develop floor plans with exits shown, fire extinguishers, chemical storage rooms, emergency ladders, etc.



Emergency Action Plan

Use a site drawing to show emergency exit paths and assembly areas, chemical storage, water sources, alarm methods. Share with the FD on an invited visit.



Why Training

- All employees are to know how to perform their jobs safely. They need to know about material, equipment, hazards, and control method. Training is critical to new employees.

Employee's right to know = responsibility to follow safety.

- Supervisors must be trained and serve to reinforce training and enforce proper and safe work methods. (refresh and discipline).

Supervisors right to be trained= Responsibility to train and enforce.

- Employers are obligated to provide a safe and healthy workplace. Employers must have a method to ensure training is done. In many cases training must be documented.

Employers must provide the resources and training to do the job safely = protection from fines, law suits and accidents.



When is Training Needed

- New and reassigned employees and workers
- When new equipment or processes are introduced.
- When new procedures are developed.
- When new information / knowledge is made available.
- When accidents and injuries show a lack of training

When employee performance needs to improve

Examples of Required Training

* GHS annual training required

- Access to Medical Records
- *Bin Entry (cleaning bins)
- Bloodborne Pathogens
- Confine Space
- Electrical Work Practices
- *Emergency Action Plan
- Fall Protection Equipment
- First Aid
- Employee Orientation
- Use of Fire Extinguishers
- Forklift Operator
- Front-end Loader/Bobcat
- Hazard Communication
- Hearing Protection
- Manlifts
- *Lockout and Tagout
- *Explosion Hazards and prevention.
- Personal Protective Equipment
- Pesticide Application
- *Emergency Response/Rescue
- Respiratory Protection
- Truck Dumper Operation
- Rail Operations Safety
- *Welding/Cutting/ Hotwork
- Grain Handling Equipment
- *Planned Maintenance
- Process Safety Management
- River Operations Safety
- Storage and handling of LP Gases
- Storage and handling of Anhydrous Ammonia
- Exposure to Asbestos, lead, other chemicals as appropriate

More Safety Training

- Rail operations
 - ***Explosion prevention- hazards related to dust, ignition sources, smoking. cleaning procedures, clearing legs, housekeeping**
- Truck receiving
- Loading operations
- Operating Hammermills, blenders, etc.
- Running a dryer
 - ***Fumigation**
- Proper lifting
- Special tools and equipment
 - ***Maintenance procedures**

* annual training required in 1910.272

1910.272 e Training requirements

- Emergency action plan -1910.38a
- Training – annually, new job assignment.
 - hazards related to dust
 - ignition sources, smoking
 - cleaning procedures
 - clearing legs and hammer mills
 - housekeeping

GHS Training Continued

Special task training

- - bin entry (engulfment & mechanical hazards)
(g & h)
 - hot work 1910.272(f)
 - preventive maintenance 1910.272(m)
 - lockout/tagout 1910.272(m)(4)
 - handling of flammable/toxic substances

How do you manage so many topics? Need

1. Determine all the required topics needed for all the workers?
2. Determine specific needs for the various jobs or duties.
3. Conduct a safety analysis of each job and area of the plant and what is needed.
4. Make training a team effort of supervisors and employees.
5. Give support and resources- equipment time and place to do training.
6. Assign someone to oversee that training takes place.
7. OSHA does not require you to keep records of training. However, If it is not written down it didn't happen.

Training Calendar

Microsoft Excel - Even Years annual training.xls

Page 1

ANNUAL TRAINING 2003

Employee	January		February		March			April	May		Comments
	8th	22	9	23	2	18	29				
Bill Goodboy	BG	BG	BG	BG	BG	Off - BG	BG				BG rec 3/23r
Sam Doesfine	SD	SD	SD	SD	SD	SD	SD				
George Couldve	GC	GC	GC	GC	GC	GC	Off - GC				Geo did on 4/5

Employee Orientation
Access to Medical Records
Hazard Communication
Emergency Action
Confined Space Entry
Entry into Grain Storage Spaces
Rescue Squad or Fire Dept
Hearing Protection
Fire Extinguishers
Lockout/Tagout
Electrical Work Practices

Preview: Page 1 of 1

Start | Training ... | 95 Proce... | MSN Hot... | Acrobat ... | Microsof... | Suggest... | Microso... | Docume... | Docume... | CAPS | 2:38 AM

Hot Work and Welding Procedures

1910.272 (f)

1910.252 (a)

- Maintain control
- Protect employees, property, product
- Identify procedures and process
- Define; Hot Work is any work that creates open flames, sparks, or high temperatures that could ignite grain dust. Welding, Cutting, brazing, soldering, sparks (grinding) are examples.

Management Practices

Live site hotwork procedures



WELDING, CUTTING & HOT WORK PERMIT		
<p>This permit shall be filled out completely and each item initialed by the Plant Manager or designated Supervisor and the Employee, who is to perform the work, before any welding, cutting or hot work is performed in any grain handling or processing area. The authorizing Manager/Supervisor and employee shall physically inspect the area for all listed safety requirements. If equipment is being repaired or installed, proper lockout procedures shall be followed. Welding and Cutting shall not be permitted inside or within 50' of any facility building/structure unless that building/structure is completely shut down and isolated from the rest of the facility. (All Managers, Supervisors, workers shall know and comply with Corporate safety procedures).</p>		
Location:	Date:	Time:
Description Of Work:		
Person(s) Performing Hotwork:		
Safety Requirements:	Yes	NA
1. All operations in the building/structure/area, including dust systems, are completely shut down and isolated.	<input type="checkbox"/>	-----
2. Combustible gas test conducted, (if applicable) (tests should be done in all areas)	<input type="checkbox"/>	-----
3. Conveyors, legs, fans and other equipment associated with the building/structure/area are shut down and locked out.	<input type="checkbox"/>	-----
4. All spouts, ducts, floor, wall, and bin openings tightly covered and sealed. Do not cut or weld on spouts lined with combustible materials such as polyethylene, urethane, rubber or PVC.	<input type="checkbox"/>	<input type="checkbox"/>
5. Floors, walls, and surrounding area thoroughly cleaned of exposed combustibles and area wet down. (No exposed combustibles are allowed within 50' of the work area and shielded from sparks with non-combustible material). (If freezing conditions exist, wetdown may be omitted).	<input type="checkbox"/>	-----
6. Fire extinguisher(s) readily available within 25' of the work area.	<input type="checkbox"/>	-----
7. Welding, cutting and hot work equipment is inspected for safe condition before use and personal protective equipment is obtained before beginning work.	<input type="checkbox"/>	-----
8. Fire watch scheduled to inspect work area, and areas below, every 30 minutes for a minimum of 4 hours after completion of work. Fire watch time may be greater depending on conditions.	<input type="checkbox"/>	-----
Employee(s) or Contractor Performing Hot Work		
Facility Manager or Designate Issuing Permit		
Expiration of permit (not to exceed one shift duration)	Date:	Time:
Completion of Hot Work	Date:	Time:

333-BPT • Victor Lundeen Co. Printers • Fergus Falls, Minnesota

ORIGINAL - TO HOTWORK SITE COPY - HELD BY PERMIT WRITER
COMPLETED PERMIT TO BE KEPT ON FILE FOR A 1 YEAR PERIOD MINIMUM.

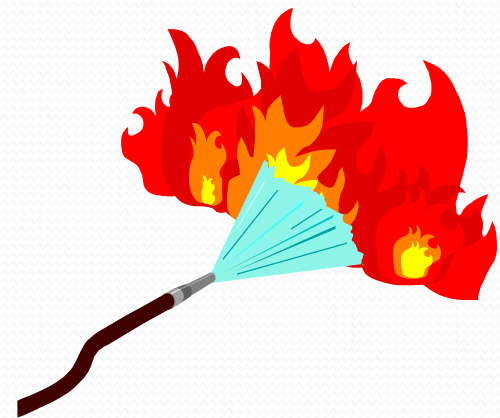


Hot Work Permit System

- Understand requirements of program (train)
- Hot Work: Know your ignition sources
- Permit completed prior to work
- Understand limitations: location, sprinklers
- Permit shall be signed, stay on job site
- Inspect area
- Fire Extinguisher

Permit System

- Remove fire hazards
- Erect guards where necessary
- Remove any accumulated dust
- Wet down area if possible
- Personal Protective Equipment
- Fire Watch
- Contractors



Hot Work Activity

- Avoid hotwork around combustibles
- Inert or vent tanks
- 35 foot rule
- Confined Space Hot Work
 - Atmosphere testing
 - Cylinders remain outside
 - Close torch valves
 - Ventilation



Completion of Hot Work

- Inspect for Hot Spots
- Fire watch to remain 30 minutes after work completed
- Properly dispose of welding rod
- Watch for radiant heating
- After hours, fire watch
- Permit retention, one month

Hot Work Permit

(Recommendation)

- Identify location
- Date
- Time of permit
- Precautions
 - Sprinklers
 - cutting/welding
 - 35 - 50 foot rule
 - combustibles
 - dust
- Work in confined space
 - Cleaned of combustibles
 - Purged, inert, ventilated
- Fire Watch
 - On site
 - Fire extinguisher
 - remain 30 - 120 min.
 - Trained
- Final Check
- Signed

Dealing with the Fuel



The grain industry is the only industry to have specific dust levels rules.



Controlling the Fuel

- **Prevention equipment leaks and control airborne dust (permanent repairs)**
- **Housekeeping in open areas-Floors, Walls and Overheads (Written Plan Required)**
- **Utilize and maintain Dust systems-check for proper operation (pressure level & bags)**
- **Have appropriate dust systems operating when handling grain**
- **Utilize enclosures to keep dust contained**

Housekeeping





HOUSKEEPING PROCEDURE

PURPOSE

- To provide guidelines for maintaining your facilities in a clean condition to the greatest extent practical to achieve safe, sanitary and efficient operations.

A small amount of dust can fuel a secondary explosion



Other Safety Issues



- ❑ Grain spills, moisture and dust accumulations can lead to slips trips and other problems.
- ❑ Generally, a well kept house implies good management.

Housekeeping Requirements

- General – applicable to all grain handling facilities
- OSHA 1910.272 (j) requires :
 1. A written housekeeping plan best to reduce accumulations of fugitive grain dust on ledges, floors, equipment, and other exposed surfaces.
 2. Shall immediately remove any fugitive grain dust accumulations whenever they exceed 1/8 inch (.32 cm) in priority housekeeping areas:
 - Floors within 35 feet of inside legs.
 - Floors of enclosed areas containing grinding equipment.
 - Floors of enclosed areas containing inside located grain dryers.
 3. Prohibits the use of compressed air to blow down dust with equipment operating unless all potential ignition sources are controlled.
 4. All grain spills must be addressed and cleaned up from the work area.
- 1. Must review plan annually and train workers on proper housekeeping.



Components of Housekeeping Policy

- Written Program
- Inspections
- Frequency
- Methods
- Spills & Leaks
- Dust Control Equipment

SAMPLE HOUSEKEEPING PROGRAM©

PREAMBLE AND PURPOSE

- It is the policy of this company to provide a safe and healthy workplace. Proper housekeeping is important to safe operations. This written housekeeping plan is established to formalize our company's policies on the procedures to be followed to regularly inspect for fugitive dust conditions and to take action to address conditions that need attention as soon as practical. This written plan also is intended to meet the requirements of the Occupational Safety and Health Administration's (OSHA) grain handling facilities standard [1910.272(i)] by reducing grain dust accumulations and controlling airborne grain dust to the degree practical.
- This written housekeeping program addresses the frequency and method(s) that will be used to clean: 1) throughout the grain handling facility; and 2) the "priority housekeeping areas" for the grain elevator portion of the grain handling facility.

Housekeeping Inspections

Sample "Any Elevator" Housekeeping Log

Inspected By: _____ Clean = C
Needs Work = NW

Week of: _____

Comments: Note floor areas and over heads needing cleaning and any equipment leaks needing repair. All floors areas near any portion of an inside bucket elevator, Legs X, Y, and Z.

Location	<u>PRIORITY AREAS</u>					Comments
	Mon	Tue	Wed	Thur	Fri	
Boot pit						
Affected Tunnel areas						
First floor near leg						
Work floor near leg						
Hammermill Room						
Gallery floor						
Leg casings/spouts						
Scale floor						
Upper garner						
Leg drive floor						

Location	<u>OTHER OPERATING AREAS</u>					Comments
	Mon	Tue	Wed	Thur	Fri	
Receiving tunnel						
Reclaim tunnel A						
Reclaim tunnel B						
Lower annex						
Upper annex						
Upper garner						
MCC 1						
MCC 2						
Substation 1						
D.S.						
Bin deck						
Outside leg pits						
Truck Shed						
Rail loading area						

Location	<u>Magnehelic Gage Readings (inches of water)</u>					Comments
	Mon	Tue	Wed	Thur	Fri	
D.S - 1						
D.S.- 2						
D.S.- 3						
D.S.- 4 annex A						
D.S - 5						
D.S.- 6						
D.S.- 7 truck rec.						
D.S.- 8 Rail loading						
D.S.-9						
D.S.-10 tripper						



Inspections

- Daily walk thru all grain handling areas
- Weekly all other areas
- Keep Logs for at least 3 months



Frequency

- Priority areas
 - Inspect and clean Daily or as deemed necessary
 - Must clean when dust accumulations exceeds 1/8 in. prior to next shift
- Other inside areas
 - Inspect and clean at least weekly as needed.
- Outside areas must check weekly and clean as needed.



Cleaning Methods

- Sweeping and Shoveling
- Vacuuming, Blow down and/or Wash down
- Clean floors and all horizontal surfaces of accumulations. Don't forget overheads.
 - Pick up all piles daily
 - Clean vertical walls and surfaces as needed but at least semi annually



Spills & Leaks

- Prompt reporting
- Cleaned – as soon as practical (48hrs.)
- Causes of leaks and spills- resolved

Dust Collection Systems

Important



Preventive Maintenance

- Must maintain dust systems to be effective
- Check Magnehelic Daily and keep between 2 and 6 inches of water press
- Repair leaks and replace bags as needed

Use proper cleaning Methods including overheads, Floors and Horizontal surfaces



**Use safe blow down operations
(permits and strict control of
ignition sources)**



Blowdown Permits

Sample Air blowdown permit

Date _____ Time _____ Expiration _____

Areas to be cleaned by blowdown _____

Tasks or activity to be done	YES	NA	Initial
1. All equipment <i>in the area completely shut down in the grain elevator or other hazardous areas.</i>			
2. All lights and electrical equipment that is to remain energized is in good condition and rated for the area.			
3. There are no Potential ignition sources such as arcs, sparks or hot surfaces is in the area. (Check bearings, shut down equipment, eliminate heat sources (steam, etc.))			
4. All Personnel exposed to blowdown dust will wear proper PPE, such as, dust masks, and goggles.			
5. Air Pressure is limited to 30 psi at the end of the nozzle.			

Authorized Employees _____

Issued by (signed) _____

(Supervisor or designated person.)

Miscellaneous

- ❑ Grounds Maintenance
 - ✓ Curb Appeal/High emphasis on appearance.
 - ✓ EPA – not just emissions, also general appearance
- ❑ Bird & Rodent Control
 - ✓ USDA, FDA regulations




-Don't forget your office areas, lunchrooms and bathrooms



Problem Areas

- Notify supervisor or manager of housekeeping concerns and needed projects.
- The best kind of housekeeping is the kind where little or no effort is required.



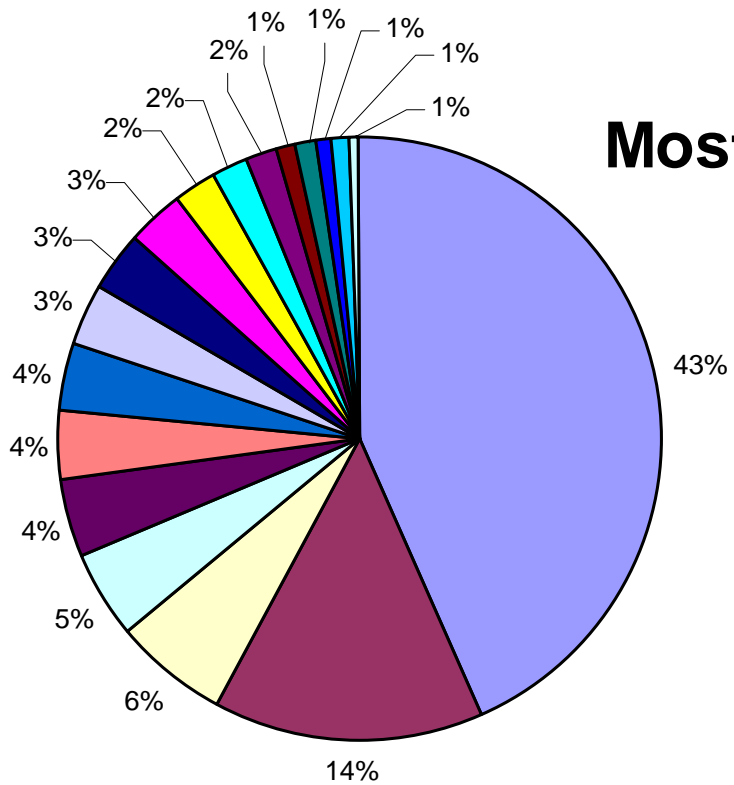
Housekeeping is a critical
Element to Facility Safety ,
customer satisfaction, and
employee morale.



Preventive Maintenance 272m

1. Conduct regular inspection of safety control devices and mechanical equipment for dryers, processing equipment, dust collectors and bucket elevators.
2. Lubricate in accordance with manufactures recommendations or as needed based on operations.
3. Promptly correct malfunctioning equipment such as, dust systems, over heated bearings , slipping or misaligned bucket elevators.
4. Certify each inspection by making a written record of what was inspected, by whom & date.
5. Use proper lockout and tagout procedures when servicing equipment.

Most Frequent Ignition sources



- | | | |
|--|----------------------------|--------------------------------------|
| ■ Unknown | ■ Welding | ■ Fire other than welding or cutting |
| ■ Overheated bearings | ■ Miscellaneous | ■ Tramp metal |
| ■ Friction sparks | ■ Other spark | ■ Electrical failure |
| ■ Unidentified foreign objects | ■ Friction from choked leg | ■ Lightning |
| ■ Faulty motors | ■ Extension cords in legs | ■ Static electricity |
| ■ Fire from friction of slipping belt in leg | ■ Rubbing Pulley | ■ Smoking Material |

Prevention of Ignition Sources

Ignition Sources

- Welding /Cutting
- Failed Bearings
- Fire
- Inspection Lamp
- Foreign Material
- Buried Lights
- Failure of Aeration Equipment
- Electrical Malfunction
- Spontaneous Combustion
- Dryer Fire
- Spark under certain conditions
- Other mechanical failure
- Improper operations

Prevention Techniques

- Use a permit system
- Monitor and use P.M.
- Detect and use safe work practices
- Use approved portable lights and keep clear of operating conveyors.
- Use grating and magnets
- Make sure lights in bins don't get buried if so lock the out.
- Use good inspection and maintenance.
- Use approved equipment and do periodic maintenance
- Use aeration and keep oily substance from oxidizing
- Use good operations and safe drying temperatures
- Avoid metal in Hammermill use magnets and grates, Do not create showers of sparks. Make sure all systems connected to ground.
- Use P.M.
- Good training and manufacturers guidelines.

Use Properly rated electrical equipment for the area



Bearing Maintenance is Critical Along with Regular Inspections



Bucket Elevator Safeguards

- **Trained Operators**
- **All bearings should be outside the leg casing**
- **Do not Jog legs to clear them. Keep Slow motion detection devices operational. Dig Legs out if they become overloaded.**
- **Leg alignment devices- inspect and Maintain**
- **Maintain Bearing monitoring devices**
- **Keep Dust Control properly Maintained**
- **Utilize quick opening inspection doors and boot clean out**



Bucket Elevator Leg Requirements

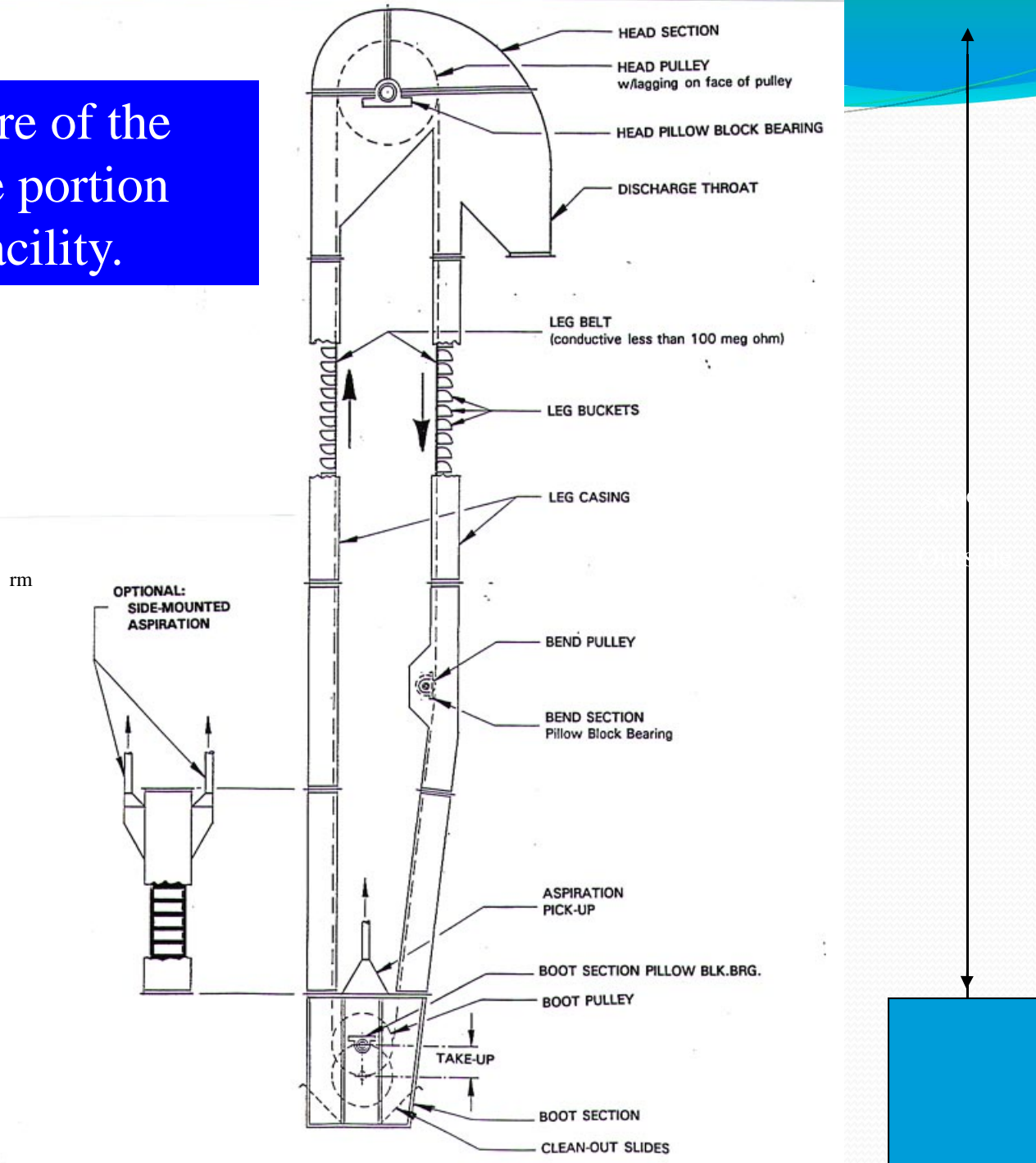
- 1. These requirements are some of the most important and touch on both equipment requirements and operating practices.
- 2. The OSHA rules only apply to inside bucket elevators at grain elevator facilities.



Bucket Elevator Leg Requirements

- 3. An Inside leg is one that has the boot and more than 20 percent of the total leg height (above grade or ground level) inside the grain elevator structure.
- 4. Portions of legs inside of rail or receiving sheds are not considered inside the facility if the remaining portion of the leg is outside.

20 % or more of the above grade portion inside the facility.





Specific Leg Requirements

1. Bucket elevators shall not be jogged to free a choked leg.
 - "Jogging" means repeated starting and stopping of drive motors in an attempt to clear choked legs.
 - Set the time on the motion switch for the leg to come to full speed to avoid jogging.



Specific Leg Requirements

- . “All belts and lagging purchased after March 30, 1988 shall be conductive. Such belts shall have a surface electrical resistance not to exceed 300 megohms.”
 - MSHA approved belting will meet rule.
 - Get certification from manufacturer regarding belting and lagging.
 - It is a good practice to lag all head pulleys on bulk raw grain legs.

Specific Leg Requirements

- . “ All bucket elevators shall be equipped with a means of access to the head pulley section to allow inspection of the head pulley, lagging, belt, and discharge throat of the elevator head. The boot section shall also be provided with a means of access for clean-out of the boot and for inspection of the boot, pulley, and belt..”



Specific Leg Requirments

- 4. “The employer shall:
 - (i.) Mount bearings externally to the leg casing; or,
 - (ii.) Provide vibration monitoring, temperature monitoring, or other means to monitor the condition of those bearings mounted inside or partially inside the leg casing.



Pillow block bearing should have a non-flammable shaft seal behind it.

Flange mounted bearings must be separated from the inside of the leg casing with a sliding seal otherwise it is a partially inside bearing.



Monitoring of Temperature or Vibration



Specific Leg Requirements

- 5. “The employer shall equip bucket elevators with a motion detection device which will shut down the bucket elevator when the belt speed is reduced by no more than 20% of the normal operating speed.”
- Options:
 - Device to count revolutions of tail pulley and alarm when below design speed.
 - A device to detect the presence of a magnetic or metallic object passing by its field of view. (Can count bolts on the belt or rotating objects.)

Specific Leg Requirements

- . Comments:
 - Device can be single point only as required as a minimum by OSHA to shut down the leg.
 - Or device can be dual point to shut down feed to leg or sound an alarm with second point set to shut down the leg if speed is reduced up to 20%.
 - Common alarm or feed shut down is 10% of rated speed. If using a single set point only many use 15% as the leg shutdown.
 - Be sure to set the timer control on the leg starter such that the leg must come to full speed in 30 seconds or less or the leg shuts down to prevent Jogging.



Specific Leg Requirements

- 6. The employer shall:
 - i.) Equip bucket elevators with a belt alignment monitoring device which will initiate an alarm to employees when the belt is not tracking properly; or,
 - (ii.) Provide a means to keep the belt tracking properly, such as a system that provides constant alignment adjustment of belts.

Specific Leg Requirements

- . Leg alignment options:
 - A. Use a rub Block Temperature Monitoring system to detect belt or pulley rubbing the leg casing.
 - B. Use a Micro switch or similar switch device that sounds an alarm when detecting the leg belt mis-aligns.
 - C. Place flanges on knee pulley of leg to require proper tracking.
 - D. Use a mechanical arm that activates when rubbed by the leg belt.
 - E. Hydraulic boot take ups can be used in lieu of a belt alignment monitor.



Alignment Monitoring
using Temperature rub
Blocks.



Specific Leg Requirements

- 7 Paragraphs (q)(5) (motion switches) and (q)(6) (belt alignment devices) are not required for grain elevators having a permanent storage capacity of less than one million bushels, provided that daily visual inspection is made of bucket movement and tracking of the belt.)
 - Storage capacity is all storage except for outside piles.
 - You need to train workers to check legs daily and verify that it is being done.
 - Motion switches are a good practices even though not required.

Specific Leg Requirements

- (1.) Paragraphs (q)(4), (q)(5), and (q)(6) of this section do not apply to the following:
 - (i.) Bucket elevators which are equipped with an operational fire and explosion suppression system capable of protecting at least the head and
 - boot section of the bucket elevator; or
 - (ii.) Bucket elevators which are equipped with pneumatic or other dust control systems or methods that keep the dust concentration inside the bucket elevator at least 25 % below the lower explosive limit at all times during operations. (Must certify with valid test data.)



Leg Venting

- Explosion venting of bucket elevators was developed thru research sponsored by NGFA to find ways to limit explosions in bucket elevators.
- You will need to request information on bucket elevator venting when you purchase a new leg from a supplier. Some of them do not tell you that it is available.
- All new legs should be installed outside of the facility per NFPA 61.

Leg Venting

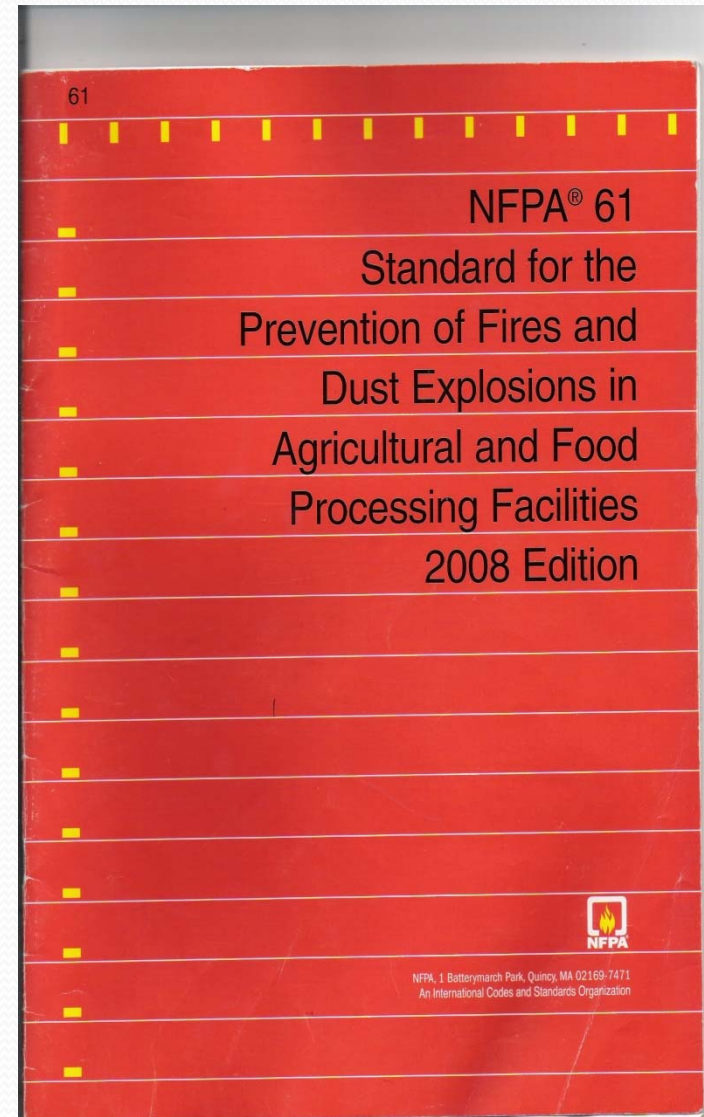
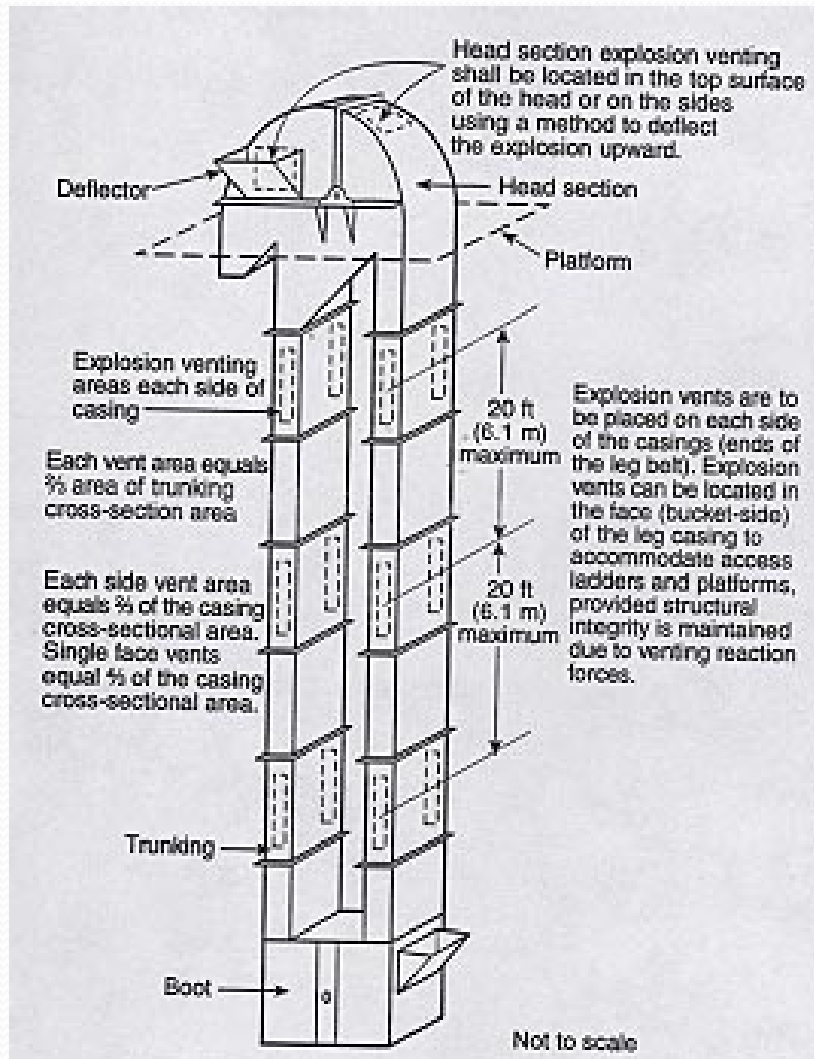


Leg Venting Effective





Leg venting is in the NFPA 61







Always Be Safe avoid Explosions

- **Never relax your guard**
- **Remember it is often the simpler matters that causes the problem because someone doesn't think it is a problem.**
- **Dust Explosions are very unpredictable and complex**
- **Be ever vigilant.**